F.3.13 POTENTIAL IMPACTS ON BIOLOGICAL RESOURCES IN R-AREA

TE | This section addresses generic impacts related to aquatic and terrestrial ecology, endangered species, and wetlands for each closure action. Discussions of site-specific data are presented in the appropriate section above.

There are 12 waste sites located within the R-Area. Ten sites are presently backfilled with soil and abandoned. The six R-Area seepage basins are surfaced with asphalt. The inactive R-Area acid/caustic basin is a wet-weather pond, and one burning/rubble pit (131-1R) received only small quantities of waste and was not backfilled.

F.3.13.1 Assessment of No Action (No Removal of Waste and No Remedial or Closure Action)

Aquatic Ecology

Potential impacts of no action on aquatic resources result from wastes entering groundwater and subsequent outcrop to Par Pond or its tributaries, or, in the case of the R-Area seepage basins, to Mill Creek, a tributary of Upper Three Runs Creek. Table F-20 lists those waste materials identified in groundwater monitoring wells within the R-Area which would exceed EPA water quality criteria for aquatic life. A waste material is listed if the highest average measured value in any well exceeded the criterion. Groundwater data are not available for the Bingham pump outage pits or the R-Area seepage basins. Because groundwater concentrations would be diluted on entering the receiving water body, Table F-19 provides a dilution factor. In all cases, the contaminants listed in the table would be below the EPA aquatic criteria after dilution.

All R-Area waste sites except the R-Area acid/caustic basin and burning/rubble pit 131-1R are backfilled and therefore would cause no adverse impacts to aquatic or semiaquatic organisms as a result of attraction to open-water areas.

Terrestrial Ecology

No action could cause adverse impacts on terrestrial resources at the R-Area waste sites. Data indicate elevated radionuclide levels in soil and vegetation at the R-Area reactor seepage basins and Bingham pump outage pits, respectively. However, the three Bingham pump outage pits and the six seepage basins are backfilled with soil and covered with asphalt, respectively, which could reduce potential transport of radioactive contaminants to the surface by vegetation and, therefore, mitigate adverse impacts.

The R-Area burning/rubble pits and the R-Area acid/caustic basin have received chemical wastes and are either backfilled with soil (burning/rubble pits 131-R) or remain open as a wet-weather pond (burning/rubble pit 131-1R and acid/caustic basin). Therefore, the potential exists for transport of chemical contaminants to the surface by vegetation growing on these sites.

As discussed in Section F.1.6, impacts via the biointrusion pathway are expected to be negligible under all closure actions at the R-Area burning/rubble pits. To assess impacts at the R-Area acid/caustic basins

associated with biointrusion under no action, maximum observed concentrations of contaminants in basin soils were compared to phytotoxicological benchmarks, and calculated plant tissue concentrations were compared to dietary levels known to be toxic to birds and mammals. The results indicate that, at the acid/caustic basin, lead and mercury occur in the soils at concentrations known to be toxic to vascular plants. However, in no case do calculated plant tissue concentrations approach those known to be toxic to herbivorous birds and mammals. Therefore, although there could be some effects on the vegetation growing on the sites, the effects should be restricted to the waste sites themselves under no action.

Endangered Species

Table F-20 lists information on endangered species in the vicinity of the R-Area waste sites. Areas apparently used by these species are sufficiently distant from the waste sites that no adverse impacts are expected as a result of closure.

A former colony site for the red-cockaded woodpecker is approximately 800 meters to the southeast of the outage pits in R-Area. This site is beyond the typical foraging distance for this species, as reported on the SRP. Therefore, none of the actions postulated for the site would have any effect on this endangered species or its critical habitats.

Wetlands

Wetlands are found within 500 meters of each of the R-Area waste sites, and within approximately 250 meters of all sites except the Bingham pump outage pits (see Table F-20). The wetlands consist of open water and bottomland hardwood forests. No action would cause no additional impacts on wetlands than may be occurring at the present time. No surface discharges to wetlands are currently occurring, and the no-action alternative would not result in anv such discharges.

F.3.13.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Aquatic Ecology

Closure and possible remedial activities are not expected to adversely impact biological resources. Erosion and sedimentation control measures would eliminate the potential for increased sedimentation. The potential for adverse impacts due to the outcropping of groundwater would be eliminated. TC

Terrestrial Ecology

The potential terrestrial impacts of no waste removal and closure for the waste sites of the R-Area would include temporary disturbance to wildlife due to noise associated with closure activities and uptake of wastes by plant roots. Installation and continued maintenance of the low permeability cap would mitigate impacts from biointrusion from root penetration. TE

Endangered Species and Wetlands

The distance to areas known to be used by endangered species and to wetlands, plus erosion and sedimentation control measures, eliminate the potential for adverse impacts on wetlands and endangered species from the no waste removal and closure.

F.3.13.3 Assessment of Removal of Waste to the Extent Practicable and Implementation of Cost-Effective Remedial and Closure Actions as Required

TE In addition to the measures described in Section F.3.13.2, wastes located in the R-Area waste sites would be removed under this action. Construction activities might take longer than under no waste removal and closure, but they would be similar. Therefore, no adverse impacts to biological resources are expected as a result of waste removal and closure action at the R-Area waste sites.

F.4 ASSESSMENT OF ACTIONS AT C- AND CS-AREA WASTE SITES

This geographic grouping is near the center of the SRP, a short distance south of F- and H-Area. As shown in Figure F-9, it is actually two separate but closely spaced groupings, one formed by waste sites near C-Reactor and the other containing sites in and around the Central Shops (CS) Area.

Sections F.4.1 through F.4.7 contain or reference the section that contains a discussion of sites 4-1 through 4-7. Section F.4.8 discusses biological impacts that are generically applicable to the waste sites in the geographic grouping.

F.4.1 CS BURNING/RUBBLE PIT, BUILDING 631-1G

This burning/rubble pit is discussed in conjunction with the other burning/rubble pits in Section F.1.6. The ecological effects of this site that relate to the C- and CS-Area geographic grouping are discussed in Section F.4.8.

F.4.2 CS BURNING/RUBBLE PIT, BUILDING 631-5G

This burning/rubble pit is discussed in conjunction with the other burning/rubble pits in Section F.1.6. The ecological effects of this site that relate to the C- and CS-Area geographic grouping are discussed in Section F.4.8.

F.4.3 CS BURNING/RUBBLE PIT, BUILDING 631-6G

This burning/rubble pit is discussed in conjunction with the other burning/rubble pits in Section F.1.6. The ecological effects of this site that relate to the C- and CS-Area geographic grouping are discussed in Section F.4.8.

F.4.4 C-AREA BURNING/RUBBLE PIT, BUILDING 131-C

This burning/rubble pit is discussed in conjunction with the other burning/rubble pits in Section F.1.6. The ecological effects of this site that relate to the C- and CS-Area geographic grouping are discussed in Section F.4.8.

F.4.5 HYDROFLUORIC ACID SPILL AREA, BUILDING 631-4G*

F.4.5.1 Assessment of No Action (No Removal of Waste, and No Remedial or Closure Actions)

Description of Action

TE Under no action, the contaminated area would remain in its current status, with groundwater monitoring continuing on a quarterly basis for 1 year and then on an annual basis for 29 years. Site maintenance would continue for the entire 30-year period.

Comparison of Expected Environmental Releases with Applicable Standards

The chemical constituents selected for assessment of the environmental impacts and health risks associated with the hydrofluoric acid spill area were fluoride and lead. Fluoride was selected because it is suspected to be present due to the nature of the material spilled. Lead was chosen because it was found to be present in the groundwater at levels higher than the threshold selection criteria.

The effects of groundwater contaminant transport were modeled by PATHRAE at two hypothetical monitoring wells located 1 and 100 meters downgradient from the site, and the groundwater discharge point at Castor Creek. All modeled constituents in the groundwater have peak concentrations below applicable standards with the exception of lead, which is predicted to have been present in the 1-meter well at a concentration of 7.0×10^{-2} milligram per liter in 1975.

This concentration exceeds the drinking-water standard for lead of 5.0×10^{-2} milligram per liter. Monitoring data indicate that the concentration of lead in the groundwater is currently below the drinking-water standard. Surface-water quality would not be affected significantly by the addition of potential waste constituents from the groundwater pathway from this source, because the concentrations of constituents in Castor Creek from this source are projected to be below drinking-water standards.

TC No carcinogenic risks from atmospheric chemical releases are expected. The EPA Hazard Index for the maximally exposed individual would be less than 3.5×10^{-7}, and would be insignificant.

Estimates of the lead and fluoride concentrations for the erosion pathway indicate that the concentrations are very small, well below levels of regulatory or health risk concern.

Potential Impacts (Other Than Releases)

Section F.4.8.1 describes general impacts to biological resources for no action. Lead and fluoride were modeled using PATHRAE, which indicates that

*The reference source for the information in this section is Huber and Bledsoe, 1987a.

the hydrofluoric acid spill area would not adversely affect aquatic organisms and habitats in Castor Creek or adjacent wetlands under any closure action. No impacts to terrestrial wildlife that use the creek to drink and feed are expected. Because the waste site remains uncovered under no action, uptake via the biointrusion pathway is possible; however, PATHRAE modeling suggests that the contaminants of concern have already migrated away from the surface soil. This would eliminate uptake by intruding plant roots.

No carcinogenic risks from atmospheric chemical releases are expected. The EPA Hazard Index for the maximally exposed individual would be less than 3.5×10^{-7}, and would be insignificant. TC

Estimates of the lead and fluoride concentrations for the erosion pathway indicate that the concentrations are very small, well below levels of regulatory or health risk concern.

Potential Impacts (Other Than Releases)

Section F.4.8.1 describes general impacts to biological resources for no action. Lead and fluoride were modeled using PATHRAE, which indicates that the hydrofluoric acid spill area would not adversely affect aquatic organisms and habitats in Castor Creek or adjacent wetlands under any closure action. No impacts to terrestrial wildlife that use the creek to drink and feed are expected. Because the waste site remains uncovered under no action, uptake via the biointrusion pathway is possible; however, PATHRAE modeling suggests that the contaminants of concern have already migrated away from the surface soil. This would eliminate uptake by intruding plant roots. TC

The hydrofluoric acid spill area is within 1000 meters of wetlands located in Carolina bays. Continuation of current practices (i.e., no action) should not have any effect on the Carolina bays, because there would be no land disturbance and the waste site does not contain any standing surface water, which would facilitate soil erosion and surface runoff. TC

F.4.5.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action TE

Under the no-removal-and-closure action, the site would remain in its current status. Groundwater monitoring would continue on a monthly basis for 1 year and then on an annual basis for 29 years. Site maintenance would continue for the entire 30-year period.

Comparison of Expected Environmental Releases with Applicable Standards

The chemical constituents, the consequences of environmental releases, and the pathways would be the same as those for no action. TC

The expected concentration for the erosion pathway is zero.

Potential Impacts (Other Than Releases)

TC | The potential ecological impacts of no waste removal and closure for the hydrofluoric acid spill area would be similar to those addressed in Sections F.4.5.1 and F.4.8.2.

F.4.5.3 Assessment of Removal of Waste to the Extent Practicable, and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

TE | The waste-removal-and-closure action would involve the excavation of approximately 230 cubic meters of potentially contaminated soil and its removal to a waste storage/disposal facility. The excavated pit would then be backfilled to grade with clean, compacted soil, with 15 centimeters of topsoil placed over the backfill, and seeded. Groundwater monitoring would continue on a quarterly basis for 1 year and then annually for 29 years. Site maintenance would continue for the entire 30-year period.

Comparison of Expected Environmental Releases with Applicable Standards

TC | The chemical constituents, the consequences of environmental releases, and the pathways would be the same as those for no action.

TC | Environmental and occupational risks due to atmospheric chemical releases from the hydrofluoric acid spill area are estimated to be about 100 times less than those for no action. No carcinogenic risks are expected, and the noncarcinogenic risks are very low. The highest EPA Hazard Index value for public and occupational exposure for the maximally exposed individual would be less than 3.5×10^{-9} and 1.2×10^{-2}, respectively.

The expected concentration for the erosion pathway is zero.

Potential Impacts (Other Than Releases)

The potential ecological impacts of waste removal and closure for the hydrofluoric acid spill area would be similar to those addressed in Sections F.4.5.1 and F.4.8.3. Waste removal would further eliminate potential ecological impacts through biointrusion.

F.4.6 FORD BUILDING WASTE SITE, BUILDING 643-11G*

The Ford Building waste site (Building 643-11G) is a low-level radioactive waste management facility that received insignificant amounts of waste in past years. No wastes are being discharged to the site at the present time. Background information on the history of waste disposal, waste characteristics, and evidence of contamination are presented in Appendix B, Section B.5.2.

*The reference source for the information in this section is Huber, et al. 1987.

F.4.6.1 Assessment of No Action (No Removal of Waste, and No Remedial or Closure Actions)

Description of Action

Under no action, general area maintenance would be performed, including removal of all trash within the site area. Groundwater monitoring wells would be installed in the vicinity of the site and would be monitored quarterly for 1 year, then annually for 29 years. Site maintenance would continue for the entire 30-year period. TE

Comparison of Expected Environmental Releases with Applicable Standards

It is anticipated that insignificant amounts of radioactivity and chemicals would be released to groundwater, surface water, and air, because the amounts of radioactive and chemical constituents discharged to the site are believed to have been very small and below applicable standards.

Potential Impacts (Other Than Releases)

A general description of the ecological impacts of no action is provided in Section F.4.8.1. In the case of the Ford Building waste site, potential impacts on the aquatic biota cannot be quantified since no PATHRAE analysis or groundwater monitoring has been performed. The Ford Building waste site is located near the wetlands along the upper reaches of Four Mile Creek and Pen Branch. No action is not expected to have any effect on these wetlands because there would be no land disturbance and the waste site does not contain any standing surface water.

F.4.6.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

Under the no-removal-and-closure action, general area maintenance would be performed including removal of all trash within the site area. No sediment would be excavated from the waste site. Groundwater monitoring and site maintenance would be conducted as described under no action. TE

Comparison of Expected Environmental Releases with Applicable Standards

It is anticipated that insignificant amounts of radioactivity and chemicals would be released to groundwater, surface water, and air because the amounts of radioactive and chemical constituents discharged to the site are believed to have been very small and below applicable standards.

Potential Impacts (Other Than Releases)

The general ecological impacts of no waste removal and closure for the Ford Building waste site are addressed in Section F.4.8.2.

F.4.6.3 Assessment of Removal of Waste to the Extent Practicable, and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

TE Under the waste removal and closure action, all trash within the site area would be monitored for contamination and removed to a waste storage/disposal facility. Approximately 345 cubic meters of soil would then be excavated from the site to a depth of 1 meter and removed to a waste storage/disposal facility in metal containers. No waste pretreatment steps are deemed necessary at this time. The site would be backfilled to grade, seeded, and maintained in a manner consistent with the surrounding grounds. Should soil analyses at closure show that elevated concentrations of waste remained in the soil after excavation, groundwater monitoring wells would be installed at the site and monitored quarterly for 1 year and then annually for 29 years. Site maintenance would be continued for the entire 30-year period.

Comparison of Expected Environmental Releases with Applicable Standards

It is anticipated that insignificant amounts of radioactivity and chemicals would be released to groundwater, surface water, and air because the amounts of radioactive and chemical constituents discharged to the site are believed to have been very small and below applicable standards.

Potential Impacts (Other Than Releases)

The general ecological impacts of waste removal and closure for the Ford Building waste site are addressed in Section F.4.8.3. However, removal of wastes and backfilling, proposed as part of the corrective action for this waste site, would minimize any further impacts.

F.4.7 FORD BUILDING SEEPAGE BASIN, BUILDING 904-91G*

The Ford Building seepage basin (904-91G) is in the central shops area of the SRP. Discharges to the basin ceased in 1984. The history of disposal, evidence of contamination, and waste characteristics of the basin are presented in Appendix B, Section B.5.3.

F.4.7.1 Assessment of No Action (No Removal of Waste, and No Remedial or Closure Actions)

Description of Action

TE Under no action, the basin would be monitored for erosion, grass would be cut, and bushes and tree seedlings would be removed. Groundwater monitoring would continue quarterly for 1 year and then annually for 29 years.

Comparison of Expected Environmental Releases with Applicable Standards

PATHRAE modeling predicts that peak concentrations of chromium and tritium either have or will exceed groundwater standards. Table F-21 lists these

*The reference source for the information in this section is Pekkala, Jewell, Holmes, Simmons, and Marine, 1987.

parameters, the corresponding regulatory standards, the maximum mean concentration recorded in monitoring wells, and the maximum concentration found, or predicted to be found, in groundwater near the basins. Peak concentrations of all other constituents are predicted to remain below applicable standards.

Surface-water quality would not be significantly affected by the addition of potential contaminants from the groundwater pathway from the site, as the resulting concentrations of constituents in Pen Branch are projected to be below drinking-water standards.

The nonradioactive contaminants were analyzed to estimate public exposure and risk attributable to atmospheric releases associated with closure (assumed to take place in 1986) and postclosure of the Ford Building seepage basin.

TC Releases are associated with suspension of contaminated dust from wind erosion; the conservative assumption is that dust generation would not be minimized by vegetative cover. Risks due to releases of carcinogens are calculated to be less than 5.0×10^{-10} for year 1986, 2085, and 2985. The EPA Hazard Index for noncarcinogenic releases is calculated to be less than 1.3×10^{-6} for each of the three years.

TC Environmental doses and risks to the maximally exposed individual due to atmospheric radiological releases from the Ford Building seepage basin were calculated using the methodology presented in the introduction to this appendix and in Appendix I. The doses were calculated to be less than 2.2×10^{-4} percent of the DOE limit of 25 millirem per year for each of the 3 years. The risks associated with these doses were calculated to be no greater than 1.5×10^{-11}.

Potential Impacts (Other Than Releases)

TC Section F.4.8.1 describes the ecological impacts of no action. PATHRAE modeling was performed on tritium, cobalt-60, strontium-90, yttrium-90, cesium-137, europium-155, uranium-238, chromium, lead, mercury, and phosphate, which were identified as having a potential impact on the aquatic system. The results indicated that these wastes would not alter the present water quality of Pen Branch. Outcropping concentrations of tritium are elevated above the drinking-water standard; however, they are significantly below the no-effect concentration for developing fish embryos and should, therefore, not affect other aquatic organisms. Wildlife drinking or feeding in Pen Branch should be unaffected by these concentrations after mixing with Pen Branch.

To assess the impacts associated with biointrusion under no action, maximum observed concentrations of contaminants in the soil were compared to phytotoxicological benchmarks. Of the metals, only mercury occurs at concentrations toxic to vascular plants. Both cesium-137 and cobalt-90 occur at concentrations that exceed DOE Threshold Guidance Limits. These results indicate that plant growth could be impaired in the abandoned seepage basin for a long time under no action. Calculations of concentrations of nonradiological contaminants in terrestrial plants growing in the seepage basin do not reveal any burdens that would be toxic to herbivorous birds and mammals.

Because this seepage basin might have standing water during times of heavy rainfall, the water could become contaminated and pose a potential impact to wildlife, including waterfowl, or vegetation that might come into contact with the water. Section F.4.8.1 describes impacts to endangered species and wetlands.

F.4.7.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

Implementation of no waste removal and closure would consist of backfilling the basin with clean soil. The berms would be pushed into the basin, the basin would be filled with compacted backfill and topsoil and seeded, and identification pylons would be placed at each corner. A total of 670 cubic meters of backfill would be required. Groundwater monitoring would continue quarterly for 1 year and then annually for 29 years. Site maintenance would be continued for the entire 30-year period. TE TC

Among the potential remedial actions for no waste removal and closure is a groundwater extraction and treatment system for tritium. The final selection of an action would be based on site-specific studies and interactions with regulatory agencies. Some of the possible treatment technologies are discussed in Appendix C.

Comparison of Expected Environmental Releases with Applicable Standards

The no-waste-removal-and-closure action is projected by PATHRAE to have no impact on tritium levels in the groundwater. Levels of chromium would be reduced but would still be above drinking-water standards at the 1-meter well. Levels of tritium and chromium in the groundwater would have to be reduced to less than the MCL of 87,000 picocuries per liter and 0.05 milligram per liter, respectively. Surface water would not be adversely impacted.

The analysis described in the air release portion of Section F.4.7.1 was also performed for this action. There would be no carcinogenic releases because the seepage basin would be capped. Noncarcinogenic releases would be from the volatilization of mercury and phosphate seepage. The EPA Hazard Index is calculated to be 1.3×10^{-16}. TE TC

The analysis for radiological releases described in Section F.4.7.1 was also performed. Releases are assumed to be zero for all constituents except tritium for this action, since the basin would be capped. Tritium has a nonzero source term in the first year due to its volatility. It would decrease to zero in 2085 and 2985 due to radioactive decay. The dose to the maximally exposed individual in 1986 is insignificant, compared to the DOE limit of 25 millirem. The risk associated with the dose is insignificant.

Potential Impacts (Other Than Releases)

A general description of the ecological impacts of no waste removal and closure is provided in Section F.4.8.2. Backfilling the basin would eliminate direct contact exposures and reduce potential impacts from the biointrusion pathway.

F.4.7.3 Assessment of Removal of Waste to the Extent Practicable, and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

TE | Under the waste-removal-and-closure action, the influent pipeline would be blanked off at the retention tank. The retention tank discharge line to the seepage basin and contaminated soil beneath the line would be excavated,
TE | packaged in metal containers, and sent to an appropriate onsite waste storage/disposal facility. Vegetation around the basin would be monitored and disposed of as necessary.

The estimated depth of contaminated soil to be removed from the floor of the basin is 46 centimeters. This amount of excavation would remove any sediment eroded from the walls to the basin floor since 1984 and most of the contaminated sediment beneath the basin floor. The total volume to be excavated (an estimated 76 cubic meters) includes sediments excavated from the sides and ends of the basin. The proposed excavation would remain well above the water table, which is about 12 meters below the basin floor.

Further closure action at the waste site would involve pushing the berms into the basin, filling the basin with compacted soil to 0.6 meter below the original ground level, adding topsoil or its equivalent, and grading to conform to the original surface contour. A total of 840 cubic meters of backfill would be required. After being graded, the site would be seeded with grass for erosion control and marked with identification pylons at each corner. Groundwater monitoring would continue quarterly for 1 year and then annually for up to 29 years.

Additional corrective action (e.g., pumping and treatment) might be needed to address the constituents already present in the groundwater. The precise actions taken would be selected based on site-specific studies and interactions with regulatory agencies.

Comparison of Expected Environmental Releases with Applicable Standards

Waste removal and closure would have no impact on peak tritium levels in the groundwater, as the peak is predicted to have occurred in the past. Levels of chromium, however, are predicted to be reduced to below the drinking-water standards. Surface water would not be adversely impacted.

The analysis described in the air release portion of Section F.4.7.1 was also performed for this action. Risks due to carcinogenic releases were calculated to be less than 2.5×10^{-14} in 1986 because of excavation activities, and
TC | zero in future years since the basin then would be capped. The EPA Hazard Index was calculated for 1986 and would be caused primarily by excavation activities. The EPA Hazard Index for subsequent years (2085 and 2985), was calculated to be due to releases from the volatilization of mercury and phosphate seepage. The Index is calculated to be less than 2.7×10^{-10}.

The dose to the maximum individual at the SRP boundary in 1986 would be less than 3.9×10^{-7} percent of the DOE limit of 25 millirem for 1986 and would be due to excavation activities. The risk associated with this dose would be less than 2.8×10^{-14}.

An analysis of the average individual worker's health risks attributable to occupational exposure to carcinogens (both nonradioactive and radioactive) and noncarcinogens was performed using the methodology presented in Appendix I. The risk to a worker from nonradioactive carcinogens was calculated to be less than 8.7×10^{-9}. The EPA Hazard Index for a worker due to noncarcinogens would be 3.6×10^{-2}. The total dose to the worker would be 0.18 millirem, which would produce an incremental risk of 5.0×10^{-8}. The total dose to the worker transporting the waste would be 7.5×10^{-2} millirem, producing an incremental risk of 2.1×10^{-8}.

Potential Impacts (Other Than Releases)

A general description of the ecological impacts of the waste removal and closure plan is provided in Section F.4.8.3.

F.4.8 POTENTIAL IMPACTS ON BIOLOGICAL RESOURCES

This section addresses those generic impacts related to aquatic and terrestrial ecology, endangered species, and wetlands for each closure and remedial action. Where a discussion of site-specific data is required for a given action, it is presented in the appropriate section above.

This appendix discusses seven waste sites located within the C- and CS-Area. The C- and CS area burning/rubble pits are presently backfilled and covered with soil and vegetation. The Ford Building waste site consists of exposed waste. The Ford Building seepage basin at one time contained low-level radioactive waste, but now it is dry, although it occasionally impounds rainwater. All seven waste sites within this geographic grouping are either inactive or abandoned. TE

F.4.8.1 Assessment of No Action (No Removal of Waste and No Remedial or Closure Action)

Aquatic Ecology

A potential aquatic impact of no action for the waste sites of the C- and CS-Areas is the indirect contamination of surface-water bodies via groundwater outcropping from the various waste sites found in this area. Table F-22 lists the waste materials in the groundwater that are known to exceed the freshwater biota criteria for each of the waste sites.

Where data are available, it can be determined that materials not modeled by PATHRAE analysis (see Table F-22) would not be expected to create or enhance existing impacts on the aquatic biota of outcropping streams. This conclusion was based on the estimated dilution factors calculated by dividing the groundwater flux by the flow rate of the receiving stream. The dilution factor indicates that these wastes would be so diluted as not to affect the present water quality of the outcropping stream. Materials modeled by PATHRAE are discussed above for the individual waste sites.

Terrestrial Ecology

The potential terrestrial impacts of no action for the waste sites of the C- and CS-Areas are the exposure of wildlife and vegetation to contaminated

standing surface water and the toxicity to vegetation by contaminated soils. Terrestrial impacts of these pathways are addressed above on an individual basis. No impacts are expected at the C- and CS-Areas burning/rubble pit site, given the qualities and types of contaminants buried at the site, the depth of burial of the waste, and the indications from PATHRAE modeling that contaminants have already migrated vertically out of the soil profile.

Endangered Species

No endangered species have been identified in the vicinity of the waste sites of the C- and CS-Area in previous surveys at the SRP (see Table F-22). The habitats in the immediate vicinity of these waste sites are not considered suitable for any Federally endangered species previously reported from the SRP. Therefore, none of the actions proposed for the waste sites of the C- and CS-Area would have any effect on threatened or endangered species.

Wetlands

Wetlands of the C- and CS-Area include two small ponds at Twin Lakes, Carolina bays, and small drainage areas of the upper reaches of Four Mile Creek and Pen Branch. Bottomland hardwood communities exist primarily along small drainages of the upper reaches of Four Mile Creek and Pen Branch and in shallow depressions of the Carolina bays. Table F-22 provides the distances between the waste sites and the wetlands. Potential impacts on these wetlands are addressed on an individual basis where warranted. For most sites, wetlands
TE | are considered sufficiently distant so as not to be affected by any closure action.

F.4.8.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Aquatic Ecology

The Ford Building seepage basin could contain standing surface waters that would be left to dry via evaporation before closure operations proceeded. There would be no direct impacts on the aquatic biota of nearby surface streams, unless surface runoff occurred before closure. As described in Section F.4.8.1, indirect contamination of surface waters via groundwater from
TC | the various waste sites of C- and CS-Area would not likely cause a change in the present water quality of the outcropping stream.

Terrestrial Ecology

The potential terrestrial impacts of no waste removal and closure for the waste sites of the C- and CS-Area include toxicity to vegetation by contaminated soils and temporary disruption of wildlife due to noise created by closure operations. Closure would reduce the likelihood of impacts from biointrusion; disturbance from noise would be of a temporary nature.

Endangered Species

TC | None of the actions proposed for the waste sites of the C- and CS-Area would have any effect on endangered species. See description in Section F.4.8.1.

Wetlands

Section F.4.8.1 describes the wetlands that exist within the vicinity of the C- and CS-Area. Disturbance of the land could initiate soil erosion. Where there is standing water, there is also a potential for surface runoff during heavy rainstorms. Remedial actions would include soil erosion and surface runoff controls for those waste sites that are near wetlands, to prevent sedimentation and contamination of wetlands.

F.4.8.3 Assessment of Removal of Waste to the Extent Practicable and Implementation of Cost-Effective Remedial and Closure Actions as Required

Aquatic Resources

The potential aquatic impacts of waste removal and closure are the same as described in Section F.4.8.2. However, the removal of wastes and contaminated soils from each of the sites of the C- and CS-Area should significantly reduce the amount of wastes leached into groundwater from contaminated soils. TC

Terrestrial Ecology

The potential impact of plant toxicity should be reduced significantly by waste removal and closure. The removal of wastes and contaminated soils should eliminate the potential for the uptake of wastes by vegetation. There would be a temporary disturbance of the wildlife due to noise and habitat loss created by closure activities.

Endangered Species

None of the actions proposed for the waste sites of the C- and CS-Area would have any effect on endangered species. See the description in Section F.4.8.1. TC

Wetlands

Section F.4.8.1 describes the wetlands that exist within the vicinity of the C- and CS-Area. As indicated in Section F.4.8.2, remedial actions should include soil erosion and surface runoff controls to protect those wetlands that are near a waste site.

F.5 TNX-AREA WASTE SITES

The TNX-Area geographic grouping is approximately 7 kilometers southwest of C-Reactor along Road 3; it is in the southwest portion of the SRP, about 15 kilometers south of A-Area. Figure F-10 shows the locations of the waste sites in this grouping, which will be assessed in the following sections.

Sections F.5.1 through F.5.5 contain, or reference the section that contains, a discussion of sites 5-1 through 5-5. Section F.5.6 discusses biological impacts that are generically applicable to the waste sites in this geographic grouping.

F.5.1 D-AREA BURNING/RUBBLE PIT, BUILDING 431-D

This burning/rubble pit is discussed in conjunction with the other burning/rubble pits in Section F.1.6. The ecological effects of this site that relate to the TNX-Area geographic grouping are discussed in Section F.5.6.

F.5.2 D-AREA BURNING/RUBBLE PIT, BUILDING 431-1D

This burning/rubble pit is discussed in conjunction with the other burning/rubble pits in Section F.1.6. The ecological effects of this site that relate to the TNX-Area geographic grouping are discussed in Section F.5.6.

F.5.3 TNX BURYING GROUND, BUILDING 643-5T*

The TNX burying ground (Building 643-5T) is a low-level radioactive waste management facility that received wastes resulting from an experimental evaporator explosion in 1953. Background information on the history of waste disposal, waste characteristics, and evidence of contamination are presented in Appendix B, Section B.6.2.

F.5.3.1 Assessment of No Action (No Removal of Waste, and No Remedial or Closure Actions)

Description of Action

TE | Under no action, all sites would be left undisturbed. Sixteen new groundwater monitoring wells would be installed around the project area. These wells
TE | would be sampled and analyzed quarterly for the first year, then annually for the next 29 years. Site maintenance would be continued for the entire 30-year period.

Comparison of Expected Environmental Releases with Applicable Standards

All environmental releases are projected to be below applicable standards for no action.

TC | The releases are evaluated in terms of predicted radionuclide concentrations for hypothetical wells 1 meter and 100 meters downgradient of the burying ground. The peak concentrations in the 1-meter well and the 100-meter well are calculated to have occurred in 1958 and 1964, respectively. The predicted peak concentrations of uranium-238 (in picocuries per liter) are 7.5 for the 1-meter well and 0.95 for the 100-meter well, and represent 31 and 4.0 percent, respectively, of the concentrations corresponding to the EPA primary drinking-water standard of 24 picocuries per liter.

No chemical contaminants are predicted to exceed groundwater MCLs in the future; however, peak nitrate concentrations (12 milligrams per liter) were calculated to have exceeded the MCLs at the 1-meter well in 1958. No groundwater monitoring data are available to evaluate current groundwater concentrations.

*The reference source for the information in this section is Dunaway, Johnson, Kingley, Simmons, and Bledsoe, 1987a.

The maximum annual doses resulting from the reclaimed farm and direct gamma exposure pathways would occur 100 years from the present, at which time institutional control of the SRP is assumed lost. The predicted doses are 1.4×10^{-4} and less than 1.0×10^{-20} millirems per year for the farm and direct gamma pathways, respectively. There would be no dose from the pathway that involves consumption of crops potentially contaminated as a result of biointrusion of subsurface sediments, due to the assumed limited plant-root depth. TC

Surface-water quality would not be significantly affected by the addition of potential contaminants from the groundwater pathway from this site, as the resulting concentrations of constituents from this source in the Savannah River are projected to be below drinking-water standards.

No radionuclides or nonradioactive constituents would be released to the atmosphere, since the waste materials lie buried beneath asphalt, buildings, and transformer pads and no excavation would take place. TC

Potential Impacts (Other Than Releases)

Section F.5.6.1 describes the ecological impacts of no action. Because the TNX burying ground has already been backfilled and covered with buildings and asphalt, the only pathway of ecological concern is the groundwater-to-surface pathway. PATHRAE analysis was conducted on nitrate and uranium-238. Analysis of the PATHRAE-generated groundwater outcrop concentrations indicates that these contaminants would not exceed the EPA water-quality criteria for the protection of aquatic life or equivalent numbers from the technical literature. Therefore, no adverse impacts are expected to occur to the aquatic communities of the Savannah River and adjacent wetlands or to wildlife that use these habitats to drink and feed under any of the closure actions. TE

F.5.3.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

Under the no-removal-and-closure action, surface structures (Building 711-T, Trailer Building 676-8T, and a 13.8-kilovolt transformer near Building 673-T) associated with the three known areas of contamination would be relocated. TE No waste material would be removed. The known burial sites would be covered with a low-permeability cap, graded, and seeded to prevent erosion. The suspected burial area would be treated in one of two ways. If soil samples from this site indicated contamination, overlying surface structures would be relocated and the area would be capped. Otherwise, the site would be left as it is. Sixteen new groundwater monitoring wells would be installed in the vicinity of the sites if the suspected burial site were found to be contaminated. Only 12 groundwater monitoring wells would be required if the suspected burial site were found to be clean. These wells would be sampled and analyzed quarterly for the first year, then annually for the next 29 years. Site maintenance would be continued for the entire 30-year period. TC

Comparison of Expected Environmental Releases with Applicable Standards

All environmental releases are projected to be below applicable standards for no waste removal and closure.

Groundwater, surface water, and air releases for no waste removal and closure would be the same as those presented for no action in Section F.5.3.1.

Potential Impacts (Other Than Releases)

TE Impacts on biological resources resulting from this closure action at the TNX burying ground are described in Sections F.5.3.1 and F.5.6.2. The presence of a clay cap and site maintenance would reduce potential for impacts via the biointrusion pathway.

Doses from the reclaimed farm and direct gamma pathways would be essentially eliminated under this action because of the installation of a cap. There would be no impact (dose is zero) for the pathway that involves consumption of crops potentially contaminated as a result of biointrusion of subsurface sediments. Such contamination would be precluded due to the limited plant-root depth.

F.5.3.3 Assessment of Removal of Waste to the Extent Practicable, and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

Under the waste removal and closure option, surface structures (Building 711-T, Trailer Building 676-8T, and a 13.8-kilovolt transformer near Building 673-T) associated with the three known areas of contamination would be relocated and the three known and one suspected burial sites would be excavated to a depth of 21.41 meters (approximately 896 cubic meters).
TC Excavated materials from the known burial sites would be packaged in metal boxes and sent to a waste storage/disposal facility. Excavated material from the suspected burial site would be treated in one of two ways. If it were determined by the Health Protection Department to be contaminated, it would be containerized in metal boxes and transported to a waste storage disposal facility. If this material were found to be clean, it would be used as fill when the site was backfilled. All four sites would then be backfilled and covered with a low-permeability cap (Figure F-2), dressed with topsoil, and seeded to prevent erosion. Sixteen new groundwater monitoring wells would be installed in the vicinity of the sites if the suspected burial site were found to be contaminated. Only 12 groundwater monitoring wells would be required if the suspected burial site were determined to be clean. These wells would be sampled and analyzed quarterly for the first year, then annually for the next 29 years. Site maintenance would be continued for the entire 30-year period.

Comparison of Expected Environmental Releases with Applicable Standards

All environmental releases are projected to be below applicable standards for waste removal and closure.

Groundwater and surface water releases for waste removal and closure would be the same as those presented for no action in Section F.5.3.1.

The dose to an individual resulting from the release of uranium to the atmosphere has been calculated to be less than 3.4×10^{-4} percent of the DOE limit of 25 millirem per year. The risks associated with this dose would be less than 2.4×10^{-11}. TC

Doses from the reclaimed farm and direct gamma pathways would be essentially eliminated under this action because of the removal of waste and the installation of a cap. There would be no dose for the pathway that involves consumption of crops potentially contaminated as a result of biointrusion of subsurface sediments, due to the limited plant-root depth.

The analysis described in Section F.5.3.1 for nonradioactive air releases was also performed for this action. Releases, attributable to the dust generated from excavation activities, were calculated to have an EPA Hazard Index of less than 1.1×10^{-12} in 1986 and zero after waste removal. TC

An analysis of the average worker's health risks attributable to occupational exposure to carcinogens (both nonradioactive and radioactive) and noncarcinogens was performed using the methodology presented in Appendix I. The risk to a worker due to nonradioactive carcinogens would be zero. The EPA Hazard Index due to noncarcinogens was calculated to be 4.36×10^{-6}. The total dose to the worker was calculated to be 0.30 millirem, which would produce an incremental risk of approximately 8.4×10^{-8}. The total dose to the worker transporting the waste was calculated as 0.13 millirem, producing an incremental risk of less than 3.7×10^{-8}.

Potential Impacts (Other Than Releases)

Impacts to ecological resources resulting from waste removal and closure at the TNX burying ground are described in Sections F.5.3.1 and F.5.6.3. The removal of waste would eliminate the potential for impacts from biointrusion.

F.5.4 OLD TNX SEEPAGE BASIN, BUILDING 904-76G*

The Old TNX seepage basin operated from 1958 to 1980. The basin received a variety of chemicals from the pilot-scale tests conducted at TNX in support of the Defense Waste Processing Facility and the plant separations area. The history of waste disposal, evidence of contamination, and waste characteristics are discussed in detail in Appendix B, Section B.6.3.1.

F.5.4.1 Assessment of No Action (No Removal of Waste, and No Remedial or Closure Actions)

Description of Action

Under no action, the site would be left in its current state and groundwater monitoring would be continued on a quarterly basis for 1 year, then annually for 29 years. Site maintenance would be continued for the entire 30-year period. TE TC

*The reference source for the information in this section is Dunaway, Johnson, Kingley, Simmons, Bledsoe, and Smith, 1987a. TE

Comparison of Expected Environmental Releases with Applicable Standards

A soil and groundwater characterization program (Simmons, Bledsoe, and Bransord, 1985) was established to study the disposition of chemicals and radionuclides sent to the old TNX seepage basin. While the basin was in operation, overflow was diverted to a nearby wetland, creating an outfall delta approximately 30 meters wide within the wetland. The characterization study identified the following contaminants in the swamp sediment and soils: radium-228, thorium-228, tritium, uranium-235, uranium-238, chromium, and mercury. The radionuclide contamination detected in the swamp was concentrated within a meter of the discharge gully leading away from the basin. The mercury was concentrated in spots throughout the swamp, however, and the chromium was also well dispersed. Most of the contamination was localized within the top 0.6 meter of sediment.

In addition to sediment and soil sampling, water samples from the swamp and wells adjacent to the basin were collected. The swamp grab sample showed elevated levels of gross alpha, gross beta, radium, silver, chromium, copper, mercury, and cyanide. The swamp water contained roughly 50 times the MCL for mercury and 700 times the MCL for gross beta.

Groundwater samples collected from the water table aquifer indicated that concentrations of several inorganic and organic chemicals, and radionuclides exceed MCLs or other health-based standards. Table F-23 lists all constituents in the groundwater that currently exceed or are projected to exceed drinking-water standards for no action. No contamination was detected in the Tuscaloosa monitoring well located near the basin.

The PATHRAE computer code was used to estimate contaminant concentrations in the groundwater and surface water near the basin. PATHRAE results indicated that future concentrations (post-1985) of chromium, lead, nitrate, trichloroethylene, and tetrachloromethane will exceed MCLs in groundwater near the basin. PATHRAE results indicated that the outfall delta is the primary source of contaminants entering the wetland. No contaminants were predicted to exceed regulatory standards in the Savannah River.

The nonradioactive constituents were analyzed to estimate public exposure and risk attributable to atmospheric releases from the old TNX seepage basin and the outfall delta. Releases are associated with wind erosion and volatilization of constituents. Risks due to releases of carcinogens were calculated to TC be less than 1×10^{-8} in the 3 evaluated years. The EPA Hazard Index for noncarcinogen releases is less than 4.5×10^{-4}.

Environmental doses and risks to the maximally exposed individual due to radiological releases from the old TNX seepage basin and outfall delta were calculated using the methodology summarized in the introduction to this appendix and presented in Appendix I. The calculated doses were less than 43 percent of the DOE limit of 25 millirem per year for each of the three selected TC years. The risks associated with the peak dose is less than 3.5×10^{-6}.

Potential Impacts (Other Than Releases)

Section F.5.6.1 describes the ecological impacts of no action. Because of previous remedial action, the only pathway relevant to ecological assessment at the old TNX seepage basin is groundwater transport to a surface outcrop. PATHRAE modeling has been performed for chromium, lead, mercury, nickel, nitrate, silver, tetrachloromethane, trichloroethylene, tritium, thorium-232, uranium-235, and uranium-238. Levels of groundwater outcrop contamination predicted by PATHRAE for lead, mercury, silver, and nitrate exceed the EPA water-quality criteria for the protection of aquatic life or equivalent values from the technical literature, indicating a potential for effects on aquatic biota in the relatively unmixed waters of wetlands adjacent to the groundwater
TC | outcrop. Outcrop concentrations of silver and nitrate would exceed comparison criteria by factors of less than five, indicating little potential for impacts to wetland ecosystems. Dilution of these contaminants would reduce their concentrations to levels less threatening to the wetland biota. Mercury outcrop concentrations exceed the criteria by a factor of more than 10, while lead outcrop concentrations exceed the criteria by almost three orders of magnitude. Biological effects of outcrop concentrations of lead and mercury indicated that mercury was toxic to fathead minnows and lead was toxic to daphnia, but not to bluegill. Therefore, a potential exists for effects on the wetland biota near the outcrop, especially from elevated lead concentrations.

Groundwater outcrop concentrations of lead and nitrate also exceed the EPA drinking-water standards. Thus, wildlife that might drink the contaminated water would receive impacts. However, lead concentrations were only one-fortieth of the no-adverse-effect dietary level of 5.0 parts per million. Calculated tissue concentrations of all metals in wetland biota were below those shown to be toxic to birds and mammals. The nitrate drinking-water standard is one-ninth of the aquatic criteria and does not appear to be particularly appropriate for ecological assessment of such an important and dynamic nutrient. These results indicate that potential impacts would be negligible in view of the limited area of the groundwater outcrop and the conservative assumption of no dilution.

TE | Because of the depth of the backfilled basin, any terrestrial effects would be limited to the contaminated delta and swamp area. Based on available data, limited terrestrial impacts are anticipated under all closure actions. The contaminant concentrations in the seepage basin, delta, and swamp soils for tritium, uranium-235 and -238, thorium-228, and nitrate exceed EPA soil criteria. Based on the maximum contaminant concentrations in the seepage
TE | basin, delta, and swamp soils for chromium, mercury, nickel, and silver, these contaminants could cause vegetation impacts through reduced plant growth and increased plant mortalities. However, food-chain uptake calculations indicate that the predicted vegetation concentrations are below the levels considered toxic to herbivorous terrestrial wildlife.

F.5.4.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

Before the site could be closed, an office trailer and an equipment laydown area would have to be relocated, and the asphalt pavement and clay cap over the top of the basin would have to be removed and replaced with one that meets current requirements. Under this action, the top 1.8 meters of basin material would be excavated. The approximately 1218 cubic meters of material would be removed to a waste storage/disposal facility in metal boxes. A low-permeability cap would be placed over the excavated site, and groundwater monitoring would be continued quarterly for 1 year, then annually for 29 years. Site maintenance would be continued for the entire 30-year period. TE

The PATHRAE results indicate that excavating the basin sediments and covering the site with a low-permeability cap would have no significant effect on contaminant releases to the groundwater. Therefore, the contaminant release data given in Table F-23 would also be applicable to this closure action. TE

Additional corrective actions (e.g., treatment of groundwater and excavation of contaminated wetland sediments) might be needed to address constituents already in the groundwater and sediments. The selection of any action would be based on site-specific studies and interactions with regulatory agencies.

Comparison of Expected Environmental Releases with Applicable Standards

The closure and remedial actions described above are expected to reduce groundwater concentrations of cadmium, chromium, lead, mercury, nickel, nitrate, trichloroethylene, tetrachloromethane, gross alpha, gross beta, and radium to within MCLs or ACLs. Excavation of sediments from the outfall delta and backfilling with clean material are expected to reduce contaminant levels in the swamp to levels found in similar undisturbed wetlands. TE

The analysis described in the air release portion of Section F.5.4.1 was also performed for this action. Atmospheric releases of carcinogens are due to the volatilization of the constituents. Risks were calculated to be less than 2.6×10^{-17}. The EPA Hazard Index for releases of noncarcinogens is less than 7.8×10^{-12}. TE TC

The radiological releases and resulting doses are less than those presented in Section F.5.4.1 for no action. The resultant risk to the maximally exposed individual has a peak value of 4.23×10^{-17}. TC

Potential Impacts (Other Than Releases)

Impacts to biological resources resulting from this closure action at the old TNX seepage basin would be similar to those described in Sections F.5.4.1 and F.5.6.2. TE

F.5.4.3 Assessment of Removal of Waste to the Extent Practicable, and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

Before the site could be excavated, an office trailer and an equipment laydown area would have to be relocated. The asphalt pavement and clay cap over the top of the basin would have to be removed.

The basin covered a surface area of 953 square meters. The 3 meters of clay and sand mix, 15 centimeters of SC-6 clay, and 50 centimeters of topsoil used to backfill and cap the basin in 1981 would have to be removed in addition to the 61 centimeters of contaminated basin bottom sediment. Therefore, approximately 4060 cubic meters of material would have to be excavated. The backfill material excavated from the basin would be reused. Approximately 594 cubic meters of sediment would be excavated and removed to a waste storage/disposal facility in metal boxes. TC

Approximately 594 cubic meters of backfill material would be needed to fill the basin. Groundwater monitoring at the site would continue quarterly for the first year and then annually for 29 years. Site maintenance would be continued for the entire 30-year period. Potential remedial action would be implemented as described in Section F.5.4.2. TC

Comparison of Expected Environmental Releases with Applicable Standards

The PATHRAE results indicated that contaminant releases to the groundwater would not be affected by removing waste from the basin. Therefore, the discussion of expected environmental releases presented in Section F.5.4.2 would also be applicable to waste removal and closure.

The analysis described in the air release portion of Section 5.4.1.1 was also performed for this action. Carcinogenic releases would result solely from the generation of contaminated dust as a result of excavation activities. This would occur only in the first year. Noncarcinogenic releases in the first year would be attributable to the generation of the contaminated dust as a result of excavation activities and to volatilization. In subsequent years the only source would be attributable to volatilization. Risks attributable to carcinogenic releases were calculated to be less than 1.3×10^{-12}. The EPA Hazard Index for releases of noncarcinogens was calculated to be less than 1.2×10^{-8} for each of the 3 years. TC

The radiological releases and resulting doses are greater than those presented in Section F.5.4.1 for no action. The resultant risk to the maximally exposed individual has a peak value of 1.36×10^{-8}. TC

An analysis of the health risks to the average individual worker attributable to occupational exposure to carcinogens (both nonradioactive and radioactive) and noncarcinogens was performed using the methodology presented in Appendix I. The risk to a worker due to nonradioactive carcinogens would be less than 5.7×10^{-8}. The EPA Hazard Index due to noncarcinogens would be 8.5×10^{-3}. The total dose to the worker would be 11 millirem, which would produce an incremental risk of 3.1×10^{-6}. The total dose to the worker TC

transporting the waste would be 0.55 millirem, producing an incremental risk of 1.6×10^{-7}.

Potential Impacts (Other Than Releases)

Impacts to ecological resources from this closure action at the old TNX seepage basin would be similar to those described in Sections F.5.4.1 and F.5.6.3.

F.5.5 NEW TNX SEEPAGE BASIN, BUILDING 904-102G*

The new TNX seepage basin (Building 904-102G) is a mixed waste management facility that is presently receiving wastes. Background information on the history of waste disposal, waste characteristics, and evidence of contamination are presented in Appendix B, Section B.6.3.

F.5.5.1 Assessment of No Action (No Removal of Waste, and No Remedial or Closure Actions)

Description of Action

Under no action, groundwater monitoring at the site would be continued quarterly for the first year, then annually for the next 29 years, with periodic site maintenance such as lawn and vegetation cutting. Appropriate signs and fencing would be set up to keep out wild animals and unauthorized persons. TE

Comparison of Expected Environmental Releases with Applicable Standards

PATHRAE predicts that concentrations of barium, chromium, nitrate, and uranium-238 will exceed groundwater standards for no action. Table F-24 lists these parameters, the corresponding regulatory standards, and the maximum concentrations found, or predicted to be found, in the groundwater near the basins. Only contaminants that exceed, or are predicted to exceed, standards are listed. All other constituents are found at levels below applicable standards.

Surface-water quality would not be significantly affected by the addition of potential contaminants from the groundwater pathway from this site, as the resulting concentrations of constituents from this source in the Savannah River are projected to be below drinking-water standards.

The nonradioactive constituents were analyzed to estimate public exposure and risk attributable to atmospheric releases from the new TNX seepage basin.

Releases would be caused by wind erosion and the volatilization of the constituents. Risks were calculated to be less than 1.8×10^{-9} for releases of carcinogens. The EPA Hazard Index for noncarcinogens was calculated to be less than 2.8×10^{-5} for each of the 3 years. TC

*The reference source of the information in this section is Dunaway, Johnson, Kingley, Simmons, and Bledsoe, 1987b.

Environmental doses and risks to the maximally exposed individual due to radiological releases from the new TNX seepage basin were calculated using the methodology presented in the introduction to this appendix and in Appendix I.

The doses were calculated to be less than 1.1×10^{-2} percent of the DOE limit of 25 millirem per year for each of the 3 years. The risk associated with these doses would be less than 7.2×10^{-10}.

Potential Impacts (Other Than Releases)

Section F.5.6.1 describes the ecological impacts of no action. PATHRAE analysis was conducted on barium, chromium, nickel, nitrate, phosphate, sodium, trichloromethane, and uranium-238. The PATHRAE analysis of the groundwater outcrop concentrations of these contaminants indicates that none exceed the EPA criteria for any of the closure actions. Therefore, DOE anticipates no potential impacts on the Savannah River and adjacent wetlands aquatic biota or on the birds and mammals that use these aquatic habitats to feed or drink. TE

Comparisons of maximum concentrations of contaminants measured in basin sediments with phytotoxicological criteria indicate that, although concentrations of several trace metals are elevated, only nickel would be present in toxic concentrations. Because the soil data represent maximum values of all cores collected in the basin, the potential impact of sediment contaminants on the survival and growth of vegetation at the waste site should be minor. Calculations of the uptake of contaminants from these basin soils by vascular plants yield tissue concentrations that are not potentially toxic to birds and mammals that might consume vegetation growing on the site. Thus, impacts associated with contaminated basin sediments would be restricted to the seepage basin.

A comparison of concentrations of constituents in the basin water with drinking-water standards indicates that many waste constituents approach their standards, and that fluoride and sodium exceed their standards. Therefore, these constituents could pose an impact to wildlife that consume basin water. However, given the conservative nature of the drinking-water criteria, these concentrations are not expected to be a problem.

F.5.5.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

Under the no-removal-and-closure action, 2170 cubic meters of basin water would be sent to the TNX effluent treatment plant for treatment after the facility starts operations. The basin would be backfilled with approximately 2170 cubic meters of backfill material and capped with a low-permeability cap. Groundwater monitoring at the site would be continued quarterly for 1 year, then annually for the next 29 years. Site maintenance would be continued for the entire 30-year period. TE TC

Remedial actions might be required for this action, since results of PATHRAE modeling predict that the concentrations of barium, chromium, and nitrate in the groundwater would remain above MCLs (see Table F-24).

Any pumpage from groundwater extraction wells would be subject to physical or chemical treatment to reduce contaminants to below standards. Applicable treatment technologies are discussed in Appendix C.

Comparison of Expected Environmental Releases with Applicable Standards

The implementation of this closure/remedial action would reduce all environmental releases to below MCLs or ACLs. Barium, chromium, and nitrate would be removed from the groundwater to below applicable standards (see Table F-24). In addition, all other environmental releases are projected to be below regulatory concern.

TE | The analysis described in the air release portion of Section F.5.5.1 was also performed for this action. There would be no releases to the atmosphere of
TC | noncarcinogenic constituents, since the facility would be capped. Releases of carcinogenic compounds would result in a risk to the maximally exposed individual of 1.04×10^{-20}.

The analysis for radiological releases described in Section F.5.5.1 was also performed, and the releases are assumed to be zero for all 3 years of interest, since closure would effectively bar the atmospheric release of natural uranium.

Potential Impacts (Other Than Releases)

TE | Impacts to ecological resources from this closure action at the new TNX seepage basin would be similar to those described in Sections F.5.5.1 and F.5.6.2. Drainage of the basin would eliminate the potential for wildlife being affected by contaminants in the basin water. Backfilling the basin would lessen the potential for impacts from the biointrusion pathway.

F.5.5.3 Assessment of Removal of Waste to the Extent Practicable, and Implementation of Cost-Effective Remedial and Closure Actions as Required

Description of Action

TE | Under the waste removal and closure action, the basin water would be sent to the TNX effluent treatment plant for treatment after startup of the facility. Conservative estimates indicate that 2170 cubic meters of basin water would require treatment. If waste in the new TNX seepage basin has seeped to the same depth as in the old basin, then 0.6 meter of sediment would need to be excavated; this corresponds to a volume of approximately 359 cubic meters of material. Nearly all of the remaining waste source materials would be excavated. The excavated material would be transported in metal containers to a waste storage/disposal facility.

TC | After excavation, the basin would be backfilled with approximately 2529 cubic meters of backfill material. Groundwater monitoring at the site would be continued quarterly for 1 year and then annually for the next 29 years. Site maintenance would be continued for the entire 30-year period.

TC | The concentration and extent of contamination would be significantly reduced by the removal of waste as compared to no action. The nitrate concentration in the 1-meter well would be reduced by a factor of 4.5 and 2.0 in the 100-meter well. Uranium-238 would be reduced to below the applicable

standards in both wells. However, remedial actions might be required for this action, since the results of PATHRAE modeling indicate that the concentrations of nitrate in the groundwater would remain above the MCL (see Table F-24). The exact actions would be determined by site-specific studies and interactions with regulatory agencies.

Water from any groundwater extraction wells would be subject to physical or chemical treatment to remove contaminants to within standards. Applicable treatment technologies are discussed in Appendix C.

Comparison of Expected Environmental Releases with Applicable Standards

The implementation of this closure/remedial action would reduce all environmental releases to below MCLs. Nitrate could be removed from the groundwater to below applicable standards (see Table F-24). In addition, all other environmental releases are projected to be below levels of regulatory concern.

The analysis described in the air release portion of Section F.5.5.1 was also performed for this action. Releases would be due to the earth-moving activities in year 1986. The addition of the cap would effectively bar the release of constituents in future years. Risks to the maximally exposed individual would be less than 2.9×10^{-14} for carcinogen releases. The EPA Hazard Index for noncarcinogenic releases would be less than 1.6×10^{-8}.

The analysis for radiological releases described in Section 5.5.1 was also performed. The releases would result from the excavation of the basin during the first year (1986) and would be zero thereafter due to the backfilling of the excavation site. The dose to the maximum individual at the SRP boundary was calculated to be less than 5.3×10^{-5} percent of the DOE limit of 25 millirem; the risk associated with this dose would be less than 3.7×10^{-12}. TC

An analysis of the health risks to the average individual worker that would be attributable to occupational exposure to carcinogens (both nonradioactive and radioactive) and noncarcinogens was performed using the methodology presented in Appendix I. The risk to a worker due to nonradioactive carcinogens was calculated at a value of approximately 1.1×10^{-9}. The EPA Hazard Index due to noncarcinogens was calculated to be approximately 0.11. The total dose to the worker was calculated to be 1.9×10^{-2} millirem, which would produce an incremental risk of 5.3×10^{-9}. The total dose to the worker transporting the waste was calculated as 5.4×10^{-4} millirem, producing an incremental risk of 1.5×10^{-10}.

Potential Impacts (Other than Releases) TE

Resulting impacts to biological resources would be similar to those discussed in Sections F.5.5.1 and F.5.6.3. Drainage of the basin would eliminate the potential for wildlife being affected by contaminants in the basin water. Removal of the waste would eliminate potential impacts from biointrusion.

F.5.6 POTENTIAL IMPACTS TO BIOLOGICAL RESOURCES IN THE TNX-AREA

This section addresses those general impacts related to aquatic and terrestrial ecology, as well as endangered species and wetlands for each closure and

remedial action. Where a discussion of site-specific data is required for a given action, it is presented in the appropriate section above.

Four of the five waste sites within the TNX-Area waste sites are inactive. The two D-Area burning/rubble pits are backfilled with soil, the old TNX seepage basin has been backfilled and covered with a clay cap, and the TNX burying ground is located under structures inside the TNX security fence. The fifth site, the new TNX seepage basin, is presently active and is filled to capacity with effluent channeled to Outfall X-13 and eventually to the Savannah River.

F.5.6.1 Assessment of No Action (No Removal of Waste and No Remedial or Closure Action)

Aquatic Ecology

Aquatic impacts for no action for all waste sites located in the TNX-Area are described above for each waste site. In cases where contaminants were not analyzed by PATHRAE, the contaminants in the downgradient wells were compared to EPA water-quality criteria (Table F-25); in these cases, the contaminants did not exceed the criteria after dilution.

Terrestrial Ecology

With the exception of the new TNX seepage basin, the waste sites in the TNX-Area are either backfilled and vegetated or are underneath existing structures on the TNX site. Closure would produce no new impacts on terrestrial ecological resources associated with sites, since no actions would be taken. Potential impacts from biointrusion are described above for each site.

Endangered Species

As indicated in Table F-25, no endangered species or habitat has been identified in the immediate vicinity of TNX-Area waste sites during previous surveys. Thus, this closure action would have no impact on endangered species.

Wetlands

Wetland habitats are found within 1000 meters of each of the TNX-Area waste sites, the nearest being approximately 50 meters from the old TNX seepage basin (Table F-25). Most wetland areas are over 400 meters from the waste sites. Wetland types present include emergent marsh, cypress/tupelo, bottomland hardwood, and open water. Potential impacts to wetlands are described above for each site, as appropriate.

F.5.6.2 Assessment of No Removal of Waste and Implementation of Cost-Effective Remedial and Closure Actions as Required

Aquatic Ecology

In comparison to the impacts from no action, those to aquatic resources resulting from no waste removal and closure are expected to result in decreased surface-water and groundwater contamination. For sites already backfilled, the addition of a cap is expected to reduce water infiltration and

TE

thereby reduce future groundwater contamination. Under this closure action, water from the new TNX seepage basin would be removed for treatment and the basin backfilled and covered with a low-permeability cap and topsoil. Filling the basin would eliminate potential aquatic impacts associated with basin use by organisms. Any discharge of water resulting from corrective actions would meet NPDES requirements and would have no impact on surface streams. TE

Construction activities might generate some additional sediment. However, the use of engineered sediment control structures would prevent this from having an impact.

Terrestrial Ecology

The potential terrestrial impacts of no waste removal and closure for the waste sites of the TNX-Area include the uptake of wastes by plant roots and temporary disturbance to wildlife due to noise associated with closure activities. Continued maintenance, such as mowing, would prevent impacts from root penetration of the clay cap.

Endangered Species

No impacts to endangered species are expected as a result of this closure action. TE

Wetlands

Under this closure action, no impacts to nearby wetlands are expected. The potential for increased sedimentation would be eliminated by erosion and sedimentation control measures. TE

F.5.6.3 Assessment of Removal of Waste to the Extent Practicable and Implementation of Cost-Effective and Closure Actions as Required

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No impacts to aquatic ecosystems are expected from this closure action. Waste removal would reduce additional releases of waste materials to groundwater. Because of the similarity of this closure action and the no-waste-removal-and-closure action, the discussion in Section F.5.6.2 is applicable here. TE

F.6 ASSESSMENT OF ACTIONS AT D-AREA WASTE SITES

This geographic grouping is the area of influence assigned to the D-Area oil seepage basin. It is approximately 1000 meters west of Road A (South Carolina Highway 125) and 1200 meters north of the D-Area steam plant (see Figure F-9).